



## Voyage ss2011\_v02

### GEOTRACES gp13: A Collaborative International Study of the Marine Biogeochemical Cycles of Trace Elements and their Isotopes Along a Zonal Section of the Pacific Ocean East of Australia

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#### Contribution to Australia's national benefit:

This research facilitated Australian leadership in the new international GEOTRACES program ([www.geotraces.org](http://www.geotraces.org)), studying a wide range of chemical, physical and biological processes involved in the cycling and supply of trace elements and their isotopes (TEIs) in the ocean, and their sensitivity to changing environmental and climatic conditions. This work directly addressed internationally recognised issues in climate change and identified National Research Priorities under the theme 'Environmentally Sustainable Australia'; especially in regards to goals: (PG7) "Responding to climate change and variability", and (PG5) "Sustainable use of Australia's biodiversity". Our studies have provided vital information on the prevalence and flux of key TEIs for ocean-atmosphere biogeochemical and climate models. This will enable prediction of the role of ocean biology in past (glacial) and future regulation of atmospheric CO<sub>2</sub>, and help inform policy on ocean fertilisation. We have developed innovative technologies and expertise for the broader advantages of research partners, fostered Australian research competitiveness, and improved its oceanographic science and technology capabilities through participation in leading-edge, global marine biogeochemical research.

#### As a result of this voyage:

1. We have a better understanding of the marine biogeochemistry of key TEIs in the ocean, thus facilitating their explicit inclusion in numerical models of ocean marine ecosystems, and allowing a prediction of the role of biology in regulation of carbon transfer to the deep sea.
2. Preliminary results from shipboard analysis indicate that the western end of the GP13 transect had extremely low dissolved Fe concentrations (an element vital for marine biological growth), despite proximity to continental sources. Post-cruise laboratory analysis will identify the degree of iron and nitrogen co-limitation in these waters.
3. We have mapped, for the first time, the three-dimensional distribution of TEIs in the southwest Pacific

Ocean, and conducted experiments to understand their sources, sinks and internal cycling.

We have commenced a program of high-profile international research under the GEOTRACES program. Our initiatives are prompted by the increasing recognition that TEIs are playing a crucial role as regulators and recorders of important biogeochemical and physical processes that control the structure and productivity of marine ecosystems, the dispersion of contaminants in the marine environment, the level of greenhouse gases in the atmosphere, and global climate.

#### Itinerary

Departed Brisbane  
16:00, Friday 13 May 2011  
Arrived Auckland  
08:00, Sunday 5 June 2011

#### > Voyage track ss2011\_v02

